

EIE/04/175/S07.38664

ELEP – EUROPEAN LOCAL ELECTRICITY PRODUCTION

DELIVERABLE 2.4, ISSUE 1

DISTRIBUTED GENERATION OWNERSHIP ISSUES

REVIEW OF CURRENT PRACTICES, FUTURE OPTIONS AND
EUROPEAN POLICY RECOMMENDATIONS

APRIL 2007



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EXECUTIVE SUMMARY

This study is a deliverable of the collaborative European research project ELEP “European Local Electricity Production” (<http://www.elep.net>). Its focus is on the ownership rules, regulations and practices that are implemented in the EU-15 Member States relating to distributed power generation (DG) and renewable energy (RES) facilities. It provides:

- An overview of the current DG & RES ownership rules and policies at the European and Member State level
- A review of the impact of these rules and policies on the installation and market penetration of DG and RES systems within EU energy markets
- Recommendations relating to the ownership and operation of DG and RES systems that will contribute to the removal of policy and legislative barriers restricting the uptake of these systems within EU energy markets

The key conclusions from this study are:

- European Directive 2003/54/EC is clear in its definition of the technical and legal boundaries that must exist between the different market actors within European electricity and gas markets. The unbundling rules contained with 2003/54/EC require the separation of distribution and generation interests, thus in effect prohibiting distribution network operators (DNOs) from owning generation plant.
- Although there are good reasons for the generation ownership rules in Directive 2003/54/EC, the unbundling requirements of that Directive, coupled with the traditional network planning approaches adopted by DNOs, have introduced barriers to the deployment of DG and RES at distribution level. These barriers relate primarily to the lack of consideration of DG and RES in the network development planning processes within DNOs.
- The contracting of large generators by transmission system operators (TSOs) for ancillary services is widespread across the EU. However, there is very little evidence that DG and RES systems are being contracted at distribution level by DNOs within Europe. Within the current legislative framework, the deployment of DG and RES for distribution network ancillary services is considered to be a significant opportunity for these systems. Such deployment would help contribute to the development of more flexible and potentially more efficient distribution networks, providing valuable contributions both to market development and to lowering overall fuel consumption.

The key recommendations from the study are:

1. Action should be taken at European level to enforce Article 14 (7) of Directive 2003/54/EC in respect of the requirement for distribution system operators to consider the use of DG as a means of supplanting the need to upgrade or replace electricity capacity. The lack of enforcement of this requirement is currently restricting the use of DG in applications where such technologies can provide clear benefits both in terms of reducing distribution grid infrastructure costs and in terms of improving overall energy delivery efficiency.
2. To reinforce (1) above, it is recommended that consideration be given to the introduction of legislation obliging network operators to signal the need for local power generation within their grid networks (as an alternative to grid reinforcement) and then to permit third parties to bid competitively for the generation contracts. In specific cases where the DNO believes that the deployment of DG is not beneficial, the DNO should be required to provide a written submission (ideally to a regulatory body) justifying and demonstrating why distribution network infrastructure reinforcement is the preferred solution. The scope to which DNOs can manage and control generators under this type of arrangement would have to be carefully assessed. The regulators would have a key role to play in monitoring that DNOs apply appropriate procedures.

3. As an alternative to recommendation 2 above, consideration could be given by policy makers at European and Member State level to defining the circumstances under which DNOs could be permitted to own and operate DG and RES systems to improve network operation and performance. It is recognised that this approach is could be seen to be in contradiction with current unbundling legislation and therefore the circumstances under which DNOs could be permitted to own DG and RES would have to be limited and explicitly defined. These cases are only likely to relate to situations where deploying DG and RES at specific network locations for network performance reasons would either be more cost beneficial than investing in network infrastructure, or would provide improvements to overall network efficiency. Hence it is important that DG deployment of this kind does not impact negatively on the external competitive power generation market.
4. In view of the fact that DG and RES systems do not currently provide network ancillary services for DNOs at the distribution level, it is recommended that policy measures are developed and implemented to encourage the use of DG and RES for this purpose. This requires revisions to existing DNO technical and planning frameworks to provide recognition of the positive contribution that DG and RES can play to the development and management of “more active” and potentially more efficient distribution networks within Europe.
5. New commercial frameworks should be developed and implemented that permit a market to develop in distribution-level ancillary services within which DG and RES can compete. These frameworks must provide a fair and reasonable financial reward for distribution ancillary services based on aspects such as the operational flexibility they can provide and the potential infrastructure investment deferrals that their deployment can facilitate.

Further details of the study findings and recommendations can be found in section 4 and section 5.

1 INTRODUCTION

This report is a deliverable of the collaborative European research project ELEP “European Local Electricity Production” (<http://www.elep.net>). Its focus is on the ownership rules, regulations and practices that are implemented in the EU-15 Member States relating to distributed power generation (DG) and renewable energy (RES) facilities¹.

The purpose of this research is twofold:

- To assess the impact of the current ownership rules and policies within Member States on the installation and market penetration of DG and RES systems within EU energy markets, and
- To provide recommendations relating to the ownership and operation of DG and RES systems that will contribute to the removal of policy and legislative barriers restricting the uptake of these systems within EU energy markets

2 GENERAL EUROPEAN LEGISLATIVE FRAMEWORK

There are two key pieces of European legislation of relevance to the discussion regarding the ownership boundaries of DG and RES systems, and how these relate specifically to distribution system operators:

2.1 European Directive 2003/54/EC of 26 June 2004²

This Directive is pivotal to the energy market structure of the European Union and describes common rules for the internal market in electricity. It replaces the previous Directive 96/92/EC.

Key components of Directive 2003/54/EC in relation to the ownership rules associated with DG and RES can be summarised as follows:

Clause (8) – *“...It is necessary that the independence of the distribution system operators and the transmission system operators be guaranteed especially with regard to generation and supply interests. Independent management structures must therefore be put in place between the distribution system operators and the transmission system operators and any generation/supply companies.”*

Article 14 (7) – *“When planning the development of the distribution network, energy efficiency/demand-side management measures and/or distributed generation that might supplant the need to upgrade or replace electricity capacity shall be considered by the distribution system operator.”*

Article 15 (1) – *“Where the distribution system operator is part of a vertically integrated undertaking, it shall be independent at least in terms of its legal form, organisation and decision making from other activities not relating to distribution. These rules shall not create an obligation to separate the ownership of assets of the distribution system operator from the vertically integrated undertaking.”*

Article 15 (2)(a) – *“those persons responsible for the management of the distribution system operator may not participate in company structures of the integrated electricity undertaking responsible, directly or indirectly, for the day-to-day operation of the generation, transmission or supply of electricity;”*

At the end of Article 15 there is, however, the potential for Member States to provide exemptions to the unbundling rules described above for integrated electricity undertakings serving less than 100,000 connected customers, or those that serve small isolated systems.

¹ In the case of the ELEP project, the focus is on those generation sources that are normally connected to distribution networks

² http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_176/l_17620030715en00370055.pdf

Hence there are clear European rules defined in Directive 2003/54/EC relating to the general need for distribution network operators to be unbundled from other interests, notably generation.

It is interesting to note Article 14 (7) of the Directive that requires distribution system operators to consider (amongst other things) distributed generation in the planning and development of the distribution network if they mean that electricity capacity upgrade or replacement is not required. However, it is unclear from the Directive how this requirement should be implemented given the unbundling requirements elsewhere in the Directive.

2.2 European Directive 2005/89/EC of 18 January 2006³

This Directive describes measures to safeguard security of electricity supply and infrastructure investment within the European Union, and is commonly known as “the security of supply directive”.

Although it is specifically written to address security of supply concerns and issues, there are a number of references within the Directive that have relevance to the ownership rules associated with DG and RES:

Clause (1) – *“...The guarantee of a high level of security of electricity supply is a key objective for the successful operation of the internal market and that Directive [2003/54/EC] gives the Member States the possibility of imposing public service obligations on electricity undertakings, inter alia, in relation to security of supply. Those public service obligations should be defined as precisely and strictly as possible, and should not result in the creation of generation capacity that goes beyond what is necessary to prevent undue interruption of distribution of electricity to final customers.”*

Clause (9) – *“Transmission and distribution system operators should be required to deliver a high level of service to final customers in terms of the frequency and duration of interruptions.”*

Clause (10) – *“Measures which may be used to ensure that appropriate levels of generation reserve capacity are maintained should be market-based and non-discriminatory and could include measures such as contractual guarantees and arrangements, capacity options or capacity obligations. These measures could also be supplemented by other non-discriminatory instruments such as capacity payments.”*

Clause (15) – *“Transmission and distribution system operators need an appropriate and stable regulatory framework for investment, and for maintenance and renewal of the networks”.*

Article 3 (1) – *“Member States shall ensure a high level of security of electricity supply by taking the necessary measures to facilitate a stable investment climate and by defining the roles and responsibilities of competent authorities, including regulatory authorities where relevant, and all relevant market actors and publishing information thereon. The relevant market actors include, inter alia, transmission and distribution system operators, electricity generators, suppliers and final customers.”*

Article 2 (f) – *“...In implementing the measures... Member States shall take account of... the need to ensure sufficient transmission and generation reserve capacity for stable operation.”*

Article 4 (c) – *“Member States shall ensure that transmission and, where appropriate, distribution system operators comply with the minimum operational rules and obligations on network security.”*

³ http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_033/l_03320060204en00220027.pdf

This Directive therefore provides a framework within which transmission and distribution system operators are expected to provide high levels of electricity supply availability and security via the development of their networks. In addition to this there is a requirement placed on Member States to create a stable investment climate for all market actors, and this includes the definition of roles and responsibilities of market actors within the markets of individual Member States.

These requirements, coupled with those of Directive 2003/54/EC imply that the distribution network operators should consider the installation and operation of distributed generation systems as part of their network development options, although unbundling rules would seem to require ownership of such systems to be via a third party. Experience to date would suggest that these requirements are not being enforced thoroughly given the very low interest shown by distribution system operators in distributed generation.

3 BENCHMARK REVIEW OF EU-15 MEMBER STATES

This section provides a review and overview of the current approaches to DG and RES ownership boundaries, rules and regulations the EU-15 Member States. In the case of each Member State an assessment is made of:

- The general legislative environment that currently applies
- The specific market rules in place (if any)
- The rules in place (if any) relating to the control and operation of third party generation plant by network operators
- The impact that the current rules and approaches on new DG and RES installations
- Any areas of opportunity for DG and RES arising from the current legislative environment relating to generator ownership

3.1 Austria

3.1.1 General Legislative Environment

As a result of nationalisation after the Second World War, Austria's electricity sector was dominated by public undertakings. The government traditionally regulated prices for electricity. Directive 96/92/EC concerning common rules for the internal market in electricity triggered a fundamental reorganisation of the Austrian electricity market.

Since the late 1990s, government and regulatory policy has reflected an increasing commitment to achieve full market liberalisation in a shorter period of time than that set out in the Electricity Directive. The Electricity Directive was first implemented into Austrian law by the Electricity Act in 1998 and the implementing legislation of the nine Austrian federal provinces respectively. The amendment to the Electricity Act in 2000 completed the full market opening.

As of October 1st 2001 all customers have been entitled to conclude contracts with producers, electricity dealers and electricity undertakings on their supply of electricity and to demand access to the grid with regard to these amounts of electricity. Austria has opted for a system of regulated access to the electricity grid, which has become mandatory through the Acceleration Directive.

In general though the Austrian electricity industry is still dominated by fully vertical integrated companies operating more or less on each level of the whole value chain.

However, according to the Accelerating Directive, which has introduced the principle of 'legal unbundling', transmission system operators and distribution system operators beyond a certain size need to be legally and functionally separated from other activities not related to transmission and distribution (i.e. production and/or supply). The E-Act was therefore amended in 2004 as it had until that point only provided for legal unbundling of transmission operators accounting systems.

The Austrian state or the Austrian provinces remain the majority owners of the Austrian electricity companies. This is a consequence of the Austrian federal constitution, which contains provisions governing the ownership of Austrian electricity companies and determines the minimum amount of state-owed shareholdings in Verbund and the provincial electricity utilities.

The following legislation relates to the electricity sector in Austria and to the deployment of DG:

- Electricity Act (EIWOG0, providing rules on the organisation of the electricity sector, published in BGBl I 1998/143 as amended).
- Ownership Structure Act (Bundesverfassungsgesetz Eigentumsverhältnisse der Elektrizitätswirtschaft) governing the ownership of Austrian electricity companies, BGBl 1998/143

The supreme regulatory authority for electricity is the Minister of Economics and Labour, and this includes supervising the activities of the Austrian regulator, Energie-Control GmbH (E-Control)⁴. E-Control is responsible for drawing up proposals for market rules and making them available for market participants. The provincial governments have significant powers with regard to grid operators, and they also have the authority to approve electrical power plants and issue licences to distribution network operators.

3.1.2 Specific Market Rules

As mentioned in section 3.1.1, transmission and distribution system operators beyond a certain size need to be legally and functionally separated from other activities not related to transmission and distribution (i.e. production and/or supply). Hence the network operators (at both transmission and distribution level) only have interests in the ownership and management of the electricity grid networks. The ownership of DG schemes by network operators is restricted by legislation.

The Electricity Act provides that the implementing legislation of the nine Austrian provinces must provide for all customers to be entitled (1) to conclude contracts with producers, electricity dealers and electricity undertakings on their supply of electric energy with a view to covering their own needs and (2) to be permitted access to the (transmission and distribution) grid with regard to these amounts of electricity.

3.1.3 Control and Operation of Third-Party Generation Plant by Network Operators

As detailed in 3.1.2 above, the ownership of DG schemes by network operators is restricted by legislation.

However, there are rules in Austria relating to the provision of ancillary services by generators, and there are additional regulations that define the conditions whereby the network operators can take control of the generators for this purpose. For example, primary frequency control capability is mandatory for generating units larger than 5 MW, and the Transmission System Operator manages this centrally. In terms of voltage control (reactive power) all generating units must be able to achieve a machine reactive capability of 0.9 pf lag and 0.9 pf lead. Again the management of reactive power provision and its practical implementation is performed centrally by the TSO.

It seems that no similar arrangements are in place in terms of the control by the distribution network operators of DG systems connected to the distribution network in Austria.

⁴ http://www.e-control.at/portal/page/portal/ECONTROL_HOME

3.1.4 Impact of Current Rules on DG and RES

The current rules relating to DG and RES ownership and control are generally restrictive for DG and RES in that no rules or procedures appear to exist relating to the management of DG and RES systems (below 5 MW in size) to support network operation. This means that as far as the network operators are concerned, DG and RES systems below 5 MW are systems that must be accommodated rather than being used for the benefit of network operation.

3.1.5 Opportunity Areas

It is implied above that the deployment of DG and RES as a means of providing network services to DNOs is a significant opportunity for generation sources of these types. But without appropriate technical and commercial frameworks in place, the uptake of DG and RES in these applications is unlikely to develop.

3.2 Belgium

3.2.1 General Legislative Environment

In line with Directive 96/92/EC (Electricity Directive) and Directive 2003/54/EC (Acceleration Act), Belgium is gradually opening up its electricity market to competition. Owing to Belgium's federal structure, the liberalisation process is complex. There are four legislators and four regulators in total: one of each for the federal state and for the three regions. Each of these eight bodies acts within its own jurisdiction, both geographically and substantively.

The federal legislator and regulator are competent for energy matters that, for technical or economic reasons are required to be implemented uniformly throughout Belgium. This includes regulations on energy transmission, large energy production and storage facilities, tariffs, planning policies and nuclear energy. Within their respective geographic territories, the regional legislators and regulators have jurisdiction over distribution and local transmission, renewable sources of energy and policies relating to efficient use of energy.

Belgian governmental policy-making is based largely on the EU rules, but often goes beyond them. Belgium has already anticipated the legal unbundling obligations set out in the Acceleration directive. From 1 January 2007 full liberalisation for customers has been implemented across Belgium⁵.

Finally, as required by the Electricity Directive, vertically integrated electricity undertakings are required to keep separate accounts for their production, transmission and distribution activities and, when relevant, for their activities outside the electricity industry. In addition, the Electricity Act and the regional Decrees impose the legal unbundling of transmission and distribution on the one hand and the sale of power on the other. Additionally, vertically integrated electricity undertakings must ensure that the management of their transmission activities has managerial and decision-making independence from the management of their generation, distribution or supply activities and vice versa.

The production of Energy is fully liberalised in Belgium. Generating capacity is owned and/or operated by various undertakings, such as traditional electricity utilities, large power plants and smaller generations units, self suppliers and independent producers whose generation is ancillary to some other activity.

3.2.2 Specific Market Rules

In the wake of liberalisation and anticipating the anticipating the Accelerations Directive all transmission activities previously undertaken by CPTe (a subsidiary of Electrabel set up with the public company SPE), have been transferred to a newly created private company, Elia, owned directly by Electrabel (27,45%) and Publipart (2,55 %) and indirectly by the municipalities via their holding in Publi-T (30%). The

⁵ In the Flemish and Walloon regions, the market has been fully liberalised since 1 July 2003 and 15 July 2005 respectively. Full liberalisation occurred in the Brussels-Capital region on 1 January 2007.

public following Elia's initial public offering and listing on Euronext Brussels has acquired the remaining 40 per cent of the shares.

The "legal unbundling" of Elia is reinforced by strict corporate governance rules to ensure that the interests of electricity producers and suppliers do not influence Elia in its management of the transmission grid.

Historically, electricity distribution and supply were carried out by the municipalities, most of which have regrouped themselves into so-called intercommunales. Most of the intercommunales have a private partner, Electrabel. They are therefore referred to as intercommunales *mixtes* in contrast to the intercommunales *pures*, which are purely public companies. To ensure compliance with regional legal framework, which requires the unbundling of distribution activities from supply activities to eligible clients, some of the intercommunales *pures* in the Flemish region have transferred their supply activities into a new company named Luminus and in the Walloon region have transferred these activities to ALE-trading. The intercommunales *mixtes* have transferred their supply activities to a newly created subsidiary of Electrabel.

According to the Belgian Constitution, distribution is within the jurisdiction of the regions and equates to the transport of electricity at a voltage of up to 70kV. However for historical reasons, some parts of the network equal to or less than 70kV are technically indivisible from the transmission network, and are therefore operated by Elia as transmission system operator. This result is achieved through various regulatory and legislative mechanisms at the regional level.

Hence, the European unbundling rules dominate the market structure within Belgium in terms of generator ownership boundaries, thus prohibiting the ownership of generators by the network operation parts of vertically integrated utilities. These limitations extend to the ability of network operators to directly manage generator operation.

3.2.3 Control and Operation of Third-Party Generation Plant by Network Operators

The construction of new electricity generation facilities (exceeding 25MW capacity) is subject to prior authorisation by the minister for energy following recommendation by the Belgian electricity and gas regulator CREG⁶. The same regime also applies to modifications of existing facilities, where this leads to an increase in the generating capacity of the installation of more than 10%, or 25 MW (whichever is the lower). Below these thresholds, a prior declaration must be made to the Minister for energy and the CREG. The CREG's electricity production planning programme sets out the quantities and types of production facilities that are to be encouraged. In doing so, it considers policy factors such as sustainable development, greenhouse gas emissions, demand growth and public service obligations. Additional legislative and regulatory requirements exist, the most important being an environmental permit (which is granted by the relevant regional authority).

The control and operation of third-party generation plant by network operators is not commonplace in Belgium in light of the above and the unbundling rules in place.

3.2.4 Impact of Current Rules on DG and RES

The current rules relating to DG and RES ownership and control are generally restrictive for DG and RES in that no rules or procedures appear to exist relating to the management of DG and RES systems to support network operation.

3.2.5 Opportunity Areas

The relevant regional acts do not foresee the possibility of constructing further distribution networks, hence there are no provisions relating to this.

It is possible that the deployment of DG and RES as a means of providing network services to DNOs is potentially a significant opportunity for DG and RES generation sources. But further work needs to be performed in terms of the development of technical and commercial frameworks to enable such services to be delivered in practice.

⁶ <http://www.creg.be/>

3.3 Denmark

3.3.1 General Legislative Environment

The Danish electricity market is part of the liberalised Nordic electricity market. Both Danish and EU authorities have supported liberalisation in order to stimulate free competition in electricity production and trade. Trade on the wholesale market is achieved via the power exchange Nord Pool, which facilitates trade between producers and suppliers.

The Danish Electricity Supply Bill (#234) of 1999⁷ defines the legal structure of the electricity supply industry in Denmark. Full liberalisation of the electricity market occurred on 1 January 2003.

Many new players have entered the electricity market since liberalisation. A key structural change was the unbundling of the transmission grid from electricity generation in line with EU Directives. The grid system itself is now independent, and all electricity market players have non-discriminatory rights to access and use it.

The Danish Energy Authority oversees the Danish electricity supply industry⁸.

3.3.2 Specific Market Rules

Energinet.dk⁹ has prepared a set of regulations setting out the terms for all commercial players and grid companies in the electricity markets in Eastern and Western Denmark. The market regulations are currently being harmonised and are updated regularly with a view to creating identical terms for Eastern and Western Denmark.

Generation from plants with a capacity in excess of 25 MW can only be carried out by companies that have a licence granted by the Minister for Environment and Energy. These are normally awarded for a period of 20 years.

In a similar way to generation activity, system-responsible activity can only be carried out under licence granted by the Minister for Environment and Energy. Article 36 of the Danish Electricity Supply Bill prohibits grid companies from having ownership interests in electricity production companies.

3.3.3 Control and Operation of Third-Party Generation Plant by Network Operators

As the main transmission system operator in Denmark, Energinet.dk needs access to ancillary services provided by producers and consumers of electricity (e.g. frequency response, etc). These services are required to balance generation and demand in the electricity supply system.

In practice Energinet.dk purchases these ancillary services from generators and demand sources both within in Denmark and from its neighbouring countries. The suppliers of regulating reserves and ancillary services are selected either via negotiated contracts or (to a limited degree) following a tendering process, details of which can be found on the Energinet.dk website¹⁰. The "Regulating Power" service is particularly important in Denmark given its high dependency on wind energy. This comprises the upward or downward regulation of electricity production or consumption in real time, and is used to even out the imbalances that arise when electricity demand and production differ from the levels forecasted.

Hence, although the market rules in Denmark limit the ownership of generation plant by network operators, the network operators actively seek and contract network services from generators in order to manage the day-to-day operation of their networks. However, these contracts tend to reside with larger generation plants

⁷ http://www.ens.dk/graphics/Publikationer/Laws/Bill_234.pdf

⁸ <http://www.ens.dk/sw11492.asp>

⁹ Energinet.dk is an independent public undertaking owned by the Danish State. It is the result of a merger between Eltra, Elkraft System, Elkraft Transmission and Gastra. The merger took place on 24 August 2005 (<http://www.energinet.dk/en/menu/Frontpage.htm>).

¹⁰ <http://www.energinet.dk/en/menu/System+operation/Ancillary+services/Ancillary+services.htm>

instead of distributed generation scale systems. These arrangements are similar to those in most other EU Member States.

3.3.4 Impact of Current Rules on DG and RES

The market and incentives structure in Denmark is generally favourable towards DG and RES, especially low-carbon technologies such as wind energy.

However, due to unbundling legislation, the network operators are not permitted to own generation plant, but instead contract with them in order to provide the necessary system ancillary services. These contracts are generally made with larger-scale generation facilities rather than DG systems given their ability to provide the quantities of reserve and other services that are required for system stability management.

There appears to be little, if any, active participation from distributed generation in the ancillary services market of Denmark.

3.3.5 Opportunity Areas

Due to the unbundling legislation in Denmark there are clear divisions of responsibility between the owners of the networks and other market actors. This prohibits the ownership of generation plant by network operators in Denmark.

The main opportunity for DG and RES in this context would appear to be in terms of the provision of network services to distribution network operators to augment the services provided by larger facilities to the transmission system operators.

3.4 Finland

3.4.1 General Legislative Environment

The government in Finland bases its activities with respect to national legislation for the electricity markets on the Directives 2003/54/EC and 96/92/EC. The Electricity Market Act (386/1995) lays the legislative framework for unbundling and a free market. Reform and deregulation started already in 1995. The Ministry of Trade and Industry charged the Energy Market Authority (EMA) to implement the goals of the Electricity Market Act and to safeguard the openness and effectiveness of the electricity market.

If insufficient generating capacity is available according to the opinion of the Minister, he can decide to organise a public tender for new electricity generating capacity or implement demand-side actions in order to secure the electricity supply.

Members of the Management of producers of electricity are not allowed to be involved in the management of transmission and distribution companies.

3.4.2 Specific Market Rules

Generators are seen as customers of the system operators. Contracts are made between the system operator and the producer for the connection to the grid network and for system services provided to the system operator by the generator.

Electricity in Finland is traded at the Nordic Power Exchange (Nord Pool), in which Denmark, Norway, Sweden and Finland participate. The Nordic Power Exchange is the only market place for electricity and producers have to be a member of Nordel in order to be able to participate. Although there are roughly 120 generators in Finland, Fortum produces 40% of the electricity and Pohjolan Voima 20%. There are no comments found on how this influences the open market in Finland. Most probably Nordel smooths the effect out.

The available documents on the Energy Market Authority in English do not reveal any emphasis on obligations for stimulating renewables and cogeneration in Finland. The reason might be that already 30% of the Finnish electricity is generated in district heating systems and industrial cogeneration. Traditionally, many local generators have been playing a role already in the supply of electricity so that distributed generation is a normal and well-accepted issue.

After 2007, the same company cannot manage electricity sales and electricity distribution.

3.4.3 Control and Operation of Third-Party Generation Plant by Network Operators

In Finland, the larger utilities own the majority of the transmission service operator Fingrid Oy. Fingrid has a monopoly in transmission network and fast non-spinning reserves and operates gas turbines to that end. So, there is still some dependence between electricity sales and transmission. Fingrid is organising the regulating reserve trading in competitive bidding system, where each generator can participate.

In case of failure of production to meet demand, load shedding of about 1000 MW will be used. If necessary, a second reduction step of 1000 MW will be applied. Major industries will carry out this load reduction.

Nordel is the organisation of the Nordic system operators. It will give common rules, how the operation of the transmission system is managed. Nordel does not directly control third-party generating plant.

The construction of distributed power plants can be made without discrimination. The new requirement gives the maximum prices of transmission and connection fees, which the local distribution network operator can use.

3.4.4 Impact of Current Rules on DG and RES

The EMA is also charged with controlling emission trading. Emission trading is the mechanism used to support DG and RES. Reports in the public domain do not reveal any additional support or limitations for DG and RES.

Wind power investments are subsidised by the Ministry of Trade and industry, but no subventions for electrical power generation are given.

3.4.5 Opportunity Areas

DG and RES systems are already widespread and state-of-the art in Finland.

Finland has 2790 MW capacity in district heating and 2450 MW capacity industrial cogeneration. The total CHP-capacity in Finland is 5240 MW or 1,0 kWe/capita. There is still a possibility to increase the CHP-capacity with additional 1000 MW. About 600 MW of this is in district heating sector and 400 MW in industrial sector.

3.5 France

3.5.1 General Legislative Environment

The Commission de Régulation de l'Énergie (CRE) is the independent administrative authority in charge of ensuring that producers and eligible consumers can access the public grid under fair and non-discriminatory conditions. The CRE¹¹ is also responsible for the accounting principles relating to the unbundling of generation, transmission and distribution activities, and it monitors their implementation to avoid any discrimination, cross-subsidisation or any other restriction of competition.

As regards the organisational structure for the generation of electric power, EdF is the main electricity generator in France as EdF's output exceeds 90% of the total electricity generation. Furthermore, EdF undertook to give access before November 2003, through the organisation of auctions, to 6,000 MW of generation capacities located in France. This promoted the opening-up of the French market.

French legislation prohibits a company operating the transmission system to be active in the production or the distribution of electricity or gas. Hence there is legal unbundling of the transmission and generation activities within France.

¹¹ <http://www.cre.fr/>

3.5.2 Specific Market Rules

As regards the distribution of electricity, since the Law of 8 April 1946, the ownership of the distribution belongs to the state. EdF has benefited from a quasi-exclusive right to operate the distribution network. Indeed the 1946 Law provides that the local authorities do not themselves operate the distribution grids, but are bound to grant EdF a license (a concession) to operate the electricity network.

However there are some limited exceptions to this principle:

- In the private sector, very small operators, which are only locally active, are allowed to pursue their distribution activities despite the nationalisation of the local distribution;
- In the public sector, article 23 of the 1946 Law, provides for a category of entities allowed to operate local distribution grids. These are (1) the *regiés*, i.e. entities through which local authorities may, if they wish to, directly operate the distribution grids in their own areas and (2) the *sociétés d'économie mixte*, i.e. entities in which the state or local authorities hold at least half of the capital.

Consequently, EdF and the non-nationalised distributors are the operators of the electricity distribution system.

Recent French legislation relating to legal unbundling (9 August 2004) requires distribution activities to be managed within a specific legal division of the company if these activities have more than 1 million customers or if the company is active in other areas of the electricity or gas sector (such as power generation).

3.5.3 Control and Operation of Third-Party Generation Plant by Network Operators

Articles 6 to 9 of the Electricity Law and the Decree 2000-877 of 7 September 2000 relate to the applicable procedure enabling undertakings to operate new generating units. Furthermore, local authorities and semi-public bodies may, subject to authorisation of the minister for energy, be granted the right to operate generation facilities providing they satisfy the conditions specified in Article 11-I of the Electricity Law. For the construction of new generating capacities, France has opted for an authorisation system supplemented by a tendering procedure.

When such an application for authorisation is filed, the minister publishes its main criteria in terms of generating capacity, primary energy source, generating technique and site so as to ensure transparency. There are two situations where a just a formal declaration to the minister is required in order to operate generation facilities. These are (i) plants whose installed capacity per generation site is less than or equal to 4.5 MW, and (ii) units whose application relates to an increase of generating capacity less than 10%.

The Electricity Law has granted the RTE¹² the exclusive right to operate transmission networks. RTE is also responsible for handling generator connection applications for installations of capacity greater than 12 MW.

The research performed during this study has not found examples where the network operators in France have been permitted to control and operate DG and RES generation equipment owned by third parties.

3.5.4 Impact of Current Rules on DG and RES

It would appear that the current framework in France leads the French distribution network operators to view their role solely as owners and operators of the distribution network without being able to consider DG and RES as an installation or network management option. Hence the current rules in this area can generally be considered negative towards DG and RES.

¹² RTE is an unbundled Division of EDF responsible for the transmission network (http://www.rte-france.com/index_en.jsp)

3.5.5 Opportunity Areas

The current lack of involvement of DG and RES in respect of its participation in the operation and management of the distribution network in France has the potential to provide opportunities for DG and RES systems. However, this is reliant on greater engagement on behalf of the distribution network operators in terms of the consideration of DG and RES in their planning processes, and the development and introduction of mechanisms by which DNOs can actively manage DG and RES systems to the benefit of the distribution network. Mechanisms of this type would only be applicable under specific conditions so as to ensure that EU competition and unbundling rules relating to energy are not contravened.

3.6 Germany

3.6.1 General Legislative Environment

German energy policy aims at improving competition and efficiency in the electricity sector and fostering the environmentally safe and non-polluting generation of electricity. In general, German policy-making is in line with EU rules, but often goes further.

This is true for third-party network access, as Germany had already opened its electricity market for all customers in 1998, and is especially true for environmental issues as Germany is at the forefront of renewable energy deployment in the EU.

In order to further enhance competition in electricity generation and supply, and to improve efficiency in transmission and distribution networks, Germany fundamentally changed the basic part of its energy legislation in July 2005 with the introduction of the Energy Industry Act. As a result, Germany abolished its negotiated third-party access approach to transmission and distribution grids supervised by the general competition authorities. Instead, it introduced a regulated third-party access system.

Moreover, Germany implemented rigid unbundling requirements in transforming the EC Acceleration Directive 2003/54/EC into German law. The new unbundling regime encompasses legal, functional and accounting unbundling as well as rules ensuring the protection of sensitive commercial information. An exemption to legally and functionally separate network operations applies to distribution grid operators with less than 100,000 customers directly or indirectly connected to the grid. In addition, the legal unbundling requirement for distribution grid operators is subject to a transitional period until July 2007.

The legislative framework comprises the following statutes and decrees:

The EnWG¹³ (Energy Industry Act) constitutes the general principles of transmission, distribution and supply of electricity. It also forms the legal basis for implementing important governmental decrees determining network connection and access, as well as electricity supply, in more detail: (i) the Federal Network Access Decree; (ii) the Federal Decree on Network Access Fees; (iii) the Federal Decree on Terms and Conditions of the Supply of Tariff Customers; (iv) the Federal Decree on General Tariffs for Electricity, which embodies guidelines for the approval of tariffs for the supply of tariff customers; and (v) the Decree on Concession Fees, which contains the maximum admissible levies for the use of public premises in order to operate electricity grids.

Historically, the German electricity sector is characterised by a decentralised structure with about 1,200 electricity utilities. About 900 of them are vertically integrated companies that are active as network operators and suppliers of electricity at the same time; some are also active as power generators. In the electricity sector, three levels can be distinguished: (i) the four large-scale utilities RWE, E.ON, EnBW and Vattenfall Europe, (ii) regional utilities, which are often subsidiaries of the four large-scale companies, and (iii) local utilities. In general municipal utilities are integrated companies that, apart from electricity, also supply gas, heat and water, and run waste disposal and public transport services. Whereas large-scale and regional utilities are

¹³ http://bundesrecht.juris.de/enwg_2005/index.html

generally set up as private limited companies, local utilities are either part of the municipal administration or private companies, in which the municipalities hold the majority of shares.

The generation of electricity is fully liberalised in Germany. The generation facilities are owned and operated by various undertakings, such as the four large-scale utilities RWE, E.ON, EnBW, and Vattenfall Europe, but also by independent producers and self-suppliers, as well as by co-generation plant operators and renewable electricity units, particularly wind power plants. Electricity generation in combined heat and power plants or from renewable energy sources is subject to purchase obligations by network operators.

Whereas the legally unbundled transmission operators of RWE, E.ON, EnBW and Vattenfall Europe carry out transmission activities, about 900 network operators on the regional or local level provide distribution services.

3.6.2 Specific Market Rules

As mentioned in 3.6.1, Germany implemented rigid unbundling requirements in transforming the EC Acceleration Directive 2003/54/EC into German law. Hence ownership of generation plant by network operators is restricted by legislation.

With regard to ancillary network services, these have to be provided by the Transmission System Operator. The method of procurement of these services is left open with regard to tendering procedure, contract duration and structure, although they are organised into competitive markets wherever possible. Many specific technical requirements regarding the provision of network ancillary services are written into the German Grid Code published by Deutsche Verbundgesellschaft e. V. (DVG), the association of German Transmission System Operators. However these relate to generators connected at transmission level.

German energy law does not provide for a specific administrative authorisation for the construction or operation of generation facilities. However, general requirements of German planning, building and environmental law apply. The construction and operation of a power generation facility using fuels with a thermal rating of more than 50MW requires a permit under the Federal Pollution Control Act. The permit also includes a building permit under the relevant building regulations and the exceptions necessary under laws for the protection of nature. A further permit may be required under the Federal Water Resources Act.

3.6.3 Control and Operation of Third-Party Generation Plant by Network Operators

The EnWG provides for regulated third-party access to the transmission system services. The four German transmission grid operators, which are responsible for provision of transmission services in their respective balancing zones, are required to grant objective and non-discriminatory access to the transmission network to any party wishing to connect. More specifically, access to the transmission grid is granted on the basis of a network access agreement for customers that are directly connected to the transmission grid (i.e. electricity producers and distribution grid operators).

As a result of German legislation the network operators cannot own generation plant, but instead contract for ancillary services with transmission-connected generators.

The research performed in this study has found little evidence in Germany of DG and RES connected to the distribution network either being used by, or contracted to, the DNOs to provide network ancillary services.

3.6.4 Impact of Current Rules on DG and RES

Given the legislative framework and the lack of any role for DG and RES in providing network services to DNOs, the current rules in this area can generally be considered negative towards DG and RES.

3.6.5 Opportunity Areas

In a similar way to the situation in France (and in a number of other Member States), the lack of DG and RES involvement in the management and operation of distribution networks in Germany could provide some opportunities for DG and RES systems. But again this relies on a greater engagement from the DNOs in terms of the consideration of DG and RES in their planning procedures, and the introduction of commercial mechanisms to allow appropriate remuneration to take place between market players in practice.

3.7 Greece

3.7.1 General Legislative Environment

The Greek Regulatory Authority for Energy¹⁴ (RAE) was established by Law 2773/1999. RAE formulates proposals to the Minister of Development regarding the issue of power generation authorizations. RAE monitors the implementation progress of the projects and recommends legislative measures for the further deregulation of the electricity market. It is foreseen that in the long term RAE will consider the introduction of green certificates and the establishment of a network of large-scale dispersed energy production facilities.

The evaluation of all RES applications by RAE is supported (in respect of technical issues) by the Centre for Renewable Energy Sources. This evaluation is based on the criteria laid down in article 9 of the Production Authorization Regulation, issued according to article 28 of Law 2773/1999.

The Hellenic Transmission System Operator¹⁵ (HTSO) was established by virtue of Presidential Decree 328/2000¹⁶, and its responsibilities include the operation, maintenance and development of the electric power transmission system throughout Greece, and the management of interconnections with other systems.

The Public Power Corporation¹⁷ (PPC) of Greece is the largest power generation company in Greece and the country's sole power supply company, providing electricity to approximately 7.1 million customers. PPC is also the sole company with a fully owned power transmission system in Greece, and is one of the two owners of the Hellenic Transmission System Operator with 49% of capital.

For social reasons energy pricing and taxation is the same across the whole of Greece. This creates difficulties as several dispersed islands compose the Greek territory, most of which are not connected to the mainland. So in effect the additional costs of providing power to these regions are not reflected in the electricity tariff structure.

Law 3438/2006¹⁸ transposed Directive 2001/77/EC of the European Parliament ("the Renewables Directive") and grants priority to the generation of electrical power from Renewable Energy Sources (RES) and high-efficiency cogeneration.

3.7.2 Specific Market Rules

The legal framework established by the Laws 2244/94 (guaranteed and published feed-in prices) and 2773/99 (net metering) has provided a significant stimulus for private investment in RES within Greece.

PPC is the owner of all of the thermal power stations in the Greek islands, and it also owns some RES installed capacity. Some local authorities have also invested in RES and are promoting RES at the regional level. The rest of the installations belong to the private sector that build, own and operate them. In the Greek islands it is compulsory for the PPC to purchase electricity from private RES developers at a fixed price,

¹⁴ <http://www.rae.gr/en/>

¹⁵ http://www.desmie.gr/home/index_en.asp

¹⁶ Decree 328/2000 covers the establishment and statutes of the Hellenic Electric Power Transmission System Operator S.A. (HTSO)

¹⁷ <http://www.dei.gr/>

¹⁸ Law 3438/2006 – "Generation of Electricity using Renewable Energy Sources and High-Efficiency Cogeneration of Electricity and Heat and Miscellaneous Provisions"

significantly higher than in the mainland. RAE¹⁴ is responsible for evaluating the financial robustness and the environmental issues associated with private RES investments.

The Greek Government has recently introduced new laws for the simplification of the licensing procedures of new projects of renewable and industrial sector, including energy related infrastructure (Law 3325/2005).

3.7.3 Control and Operation of Third-Party Generation Plant by Network Operators

External control by the PPC and HTSO of private (third-party) developments does not currently exist in Greece.

3.7.4 Impact of Current Rules on DG and RES

Administrative barriers to new energy infrastructure and local resistance are impeding the liberalization procedures and the development of the RES and distributed generation market. However, the very large potential for renewable energy in Greece and the distributed nature of the country (i.e. several non-interconnected islands) favour the development of the distributed generation market.

The licensing procedures have been historically a barrier to the development of the distributed generation market as well as the renewable energy sources market. This issue is being addressed by the recent law on renewable energy (June 2006). The new regulatory framework within this Law provides a simplified licensing procedure for the installation and operation of RES systems, and a new set of prices for electricity produced from RES. This includes increased prices for power generated by photovoltaic and solar thermal systems.

The absence of sufficient grid capacity has been one of the major burdens to the completion of renewable energy projects and other developments that have licences, giving serious concern to the low rate of development of such projects. The weak transmission system and distribution network is combined with other technical limitations due to the autonomous power system operation, namely in islands. These technical limitations are imposed as a result of the need to maintain the dynamic security of the system and to protect the loading limits of the thermal or RES units.

3.7.5 Opportunity Areas

As mentioned above, the administrative barriers to new energy infrastructure and local resistance are the main factors that are impeding the liberalization procedures and the development of the RES and distributed generation market in Greece.

However, the generation reserve margin in Greece is reducing and therefore there is the potential for DG and RES to make a significant contribution in this respect. This could also extend to the provision of ancillary services for network support. Hence the deployment of DG and RES as a means of providing network services to DNOs is a significant opportunity for generation sources of these types, but at present the external control by the PPC and HTSO of private (third-party) generators does not currently exist in Greece. So without appropriate technical and commercial frameworks in place, the uptake of DG and RES in these applications will most likely remain negligible.

3.8 Ireland

3.8.1 General Legislative Environment

Energy issues (and hence electricity legislation) in Ireland fall within the remit of the Department of Communications, Marine and Natural Resources¹⁹.

As with all EU Member States, European Directive 2003/54/EC and its predecessor Directives form the basis of electricity market legislation in Ireland.

¹⁹ <http://www.dcmnr.gov.ie/>

The Electricity Regulation Act (1999)²⁰ is the defining legislation relating to the electricity supply market. This Act defined public service obligations, established and defined the roles for a Commission for Energy Regulation (CER²¹), and defined the rules and requirements for licences & authorisations, and for access to transmission & distribution systems.

The Sustainable Energy Act (2002)²² established the Sustainable Energy Authority of Ireland with a wide remit including the promotion and assistance of energy efficiency, renewable energy technologies, greenhouse gas emissions reductions, and research and development to support these activities.

The Regulations in Statutory Instrument 60 (2005)²³ give further legal effect to Directive No. 2003/54/EC of the European Parliament. They provide for the strengthening of independent regulation, better levels of consumer protection, the licensing of a Public Electricity Supplier, the designation of a Supplier of Last Resort, the enhancing of security of supply provisions and other matters.

Under section 14 of the Irish Electricity Regulation Act, all generators must obtain a generation licence from the CER. The CER can consider a number of factors in evaluating a licence application including, for example, the availability of sufficient financial, managerial or technical resources to ensure that the generator is able to comply with the terms and conditions that govern the electricity generation licence. Generation Licences last for 15 years.

Under Regulation 13 of Statutory Instrument 60 (2005) the CER authorises, by way of order, the construction or reconstruction of generating stations with capacities not exceeding 2 MW. The approval process is based on the assessment of specific information submitted by the applicant that is less than that for larger generators.

Structurally, the Electricity Supply Board (ESB) dominates the electricity supply industry in Ireland. ESB is the national utility, 95% of which is owned by the Irish Government, the remaining shares being held by an employee share option trust. ESB is vertically integrated and therefore it is split into a number of divisions to comply with unbundling (business separation) legislation. These are each ring-fenced and operated independently, with separate sets of accounts.

ESB Networks is the monopoly owner of the high voltage transmission system in Ireland and is the monopoly owner and operator of the medium and lower voltage distribution system²⁴. It provides service to all 1.7 million electricity customers and the generators and suppliers of electricity in Ireland. ESB Networks is responsible for the transparent and non-discriminatory management of connections (both generation and load) to the electricity networks. This requirement is clearly set out in the legislation that established the new electricity market structures in Ireland, and is incorporated into the licences issued to ESB by the Commission for Energy Regulation (the CER).

²⁰ <http://www.dcmnr.gov.ie/NR/rdonlyres/2DACF4BD-B640-43C6-85AB-CA90CDD19BBB/25792/ElectricityRegulationAct1999.pdf>

²¹ <http://www.cer.ie/>

²² <http://www.dcmnr.gov.ie/NR/rdonlyres/6D09E5A9-8F7E-4F54-982E-F8F93AE5D242/0/SustainableEnergyAct2002.pdf>

²³ <http://www.dcmnr.gov.ie/NR/rdonlyres/002A7416-0004-4689-93EB-7FAA31F51FD5/0/final.doc>

²⁴ The terms of ESB's Distribution System Operator Licence can be found at <http://www.cer.ie/en/electricity-distribution-network-licences.aspx>

3.8.2 Specific Market Rules

The business separation implemented by ESB means that the Distribution Network Operator (ESB Networks) does not participate directly in the generation market.

However, CER document CER/04/214²⁵ defines thresholds for dispatching applicable to DG and RES systems, in particular relating to those generators that are required to be registered as centrally controllable (see 3.8.3). This covers generators greater than 5 MVA in size so is of relevance to larger DG systems (in particular gas turbines, reciprocating engines and wind power systems).

In addition, as is common with other Member States, the transmission system operator in Ireland (EirGrid²⁶) purchases network ancillary services in order to manage the control and operation of the transmission network. The main ancillary services required in Ireland are detailed on the EirGrid website and include operating reserve, reactive power, black start, and other "system support services". These services are purchased from a range of providers²⁷ and enable the maintenance of satisfactory voltage and frequency levels, as well as the restoration of power supplies after a transmission system total or partial blackout. The payments made to generators for these services are also published on the EirGrid website²⁸. The bilateral contracts between suppliers of ancillary services and the TSO that define the technical and commercial terms for providing those services are known as Ancillary Service Agreements.

The Grid Code²⁹ obliges generators connected to the transmission network to ensure that their plant has the physical capabilities to supply ancillary services, in each category appropriate to the plant technology. Generator licences mandate them to offer their ancillary services to the market, under reasonable terms.

The Distribution Code³⁰ defines the high-level technical requirements for connecting generators to the ESB Networks distribution system. However, at the current time there appear to be no formal mechanisms in place that facilitate the supply of ancillary services by DG and RES to the DNO in order to assist in the management of the distribution network.

3.8.3 Control and Operation of Third-Party Generation Plant by Network Operators

As detailed in 3.8.2, the Distribution Network Operator (ESB Networks) does not participate directly in the generation market. However, there are specific rules relating to the central dispatch of generation plant connected to the ESN Networks system. These are defined in CER document CER/04/214 and can be summarised as follows:

²⁵ "Implementation of the Market Arrangements for Electricity (MAE) in relation to CHP, Renewable and Small-scale Generation" (<http://www.eirgrid.com/eirgridportal/uploads/MAE/cer04214.pdf>)

²⁶ <http://www.eirgrid.com/>

²⁷ Mainly generators, but also includes the demand side

²⁸ [http://www.eirgrid.com/eirgridportal/uploads/Regulation and Pricing/Ancillary Service Statement of Charges and Payments 2007.pdf](http://www.eirgrid.com/eirgridportal/uploads/Regulation%20and%20Pricing/Ancillary%20Service%20Statement%20of%20Charges%20and%20Payments%202007.pdf)

²⁹ <http://www.eirgrid.com/EirgridPortal/DesktopDefault.aspx?tabid=Grid%20Code>

³⁰ http://www.esb.ie/esbnetworks/downloads/distribution_code_feb_2006.pdf

The following dispatching rules apply:

- Generators with a MEC³¹ less than or equal to 5 MVA self dispatch
- The following are required to register with the System Market Operator (SMO) as centrally controllable:
 - All grid-connected generators greater than 5 MVA
 - Generators with an aggregate MEC greater than 5 MVA connected to the distribution system; and
 - Wind farms³² with a MEC less than or equal to 5 MVA, where the development of the wind farm results in, or maintains, an aggregate MEC exceeding 5 MVA on the Contiguous Wind Farm Site³³.

These generators may also be dispatchable, provided they are able to fulfil the Distribution / Grid Code requirements for dispatchability.

- CHP and non-wind renewable generators with a MEC of 30 MVA or more, whether distribution or transmission-connected, must be dispatchable.

3.8.4 Impact of Current Rules on DG and RES

The business separation implemented by ESB means that the Distribution Network Operator (ESB Networks) is not currently permitted to own generation plant.

At transmission level, network services are provided to the TSO by generators through bilateral contract arrangements. An overview of these is provided in section 3.8.2.

At the distribution level, although there appears to be no legal or regulatory reason why DG or RES could not be contracted to provide network services to the DNO, at the current time there appear to be little or no frameworks in place in Ireland to enable this to be implemented in practice. Hence, it can be concluded that the current ownership rules and practices within Ireland are restrictive for DG and RES in relation to the network services that they may be able to provide the DNO.

3.8.5 Opportunity Areas

As implied above, the deployment of DG and RES as a means of providing network services to DNOs is a significant opportunity for generation sources of these types. But without appropriate technical and commercial frameworks in place, the uptake of DG and RES in these applications is likely to remain low.

Therefore to permit DG and RES systems to offer network services to DNOs, it is recommended that consideration be firstly given to determining whether in particular circumstances DNOs could be permitted to own and operate DG and RES systems for network performance reasons. Secondly, it is recommended that technical and commercial frameworks are developed and implemented to permit DG and RES to offer network services to DNOs within the Irish electricity market.

3.9 Italy

3.9.1 General Legislative Environment

Italy implemented the European Union Electricity Directive 96/92/CE through a national law, the so-called "Decreto Bersani" (Decree/Law 79/1999). By means of this decree the Italian electricity market started a complex process of liberalisation, resulting in the legal separation of the companies responsible for the national electricity transmission grid, generation, and other companies operating in the distribution of energy. The old monopoly company ENEL was unbundled into different generation, transmission and distribution companies.

³¹ Maximum Export Capacity

³² Defined to be a site with at least one wind turbine generator

³³ A Contiguous Wind Farm Site is defined a geographical area containing one or more wind farms with a signed TSO or DSO connection agreement

The Decree/Law 79/1999 sets 2007 as the final date for the full liberalisation of the Italian electricity market. As a result of this decree, a new authority (AEEG³⁴) has been set up to oversee regulatory and control issues within the liberalised electricity market. AEEG is also responsible for monitoring competition and providing rules for network planning.

An independent network operator (GRTN³⁵) was created in Italy with the remit to guarantee open and non-discriminatory access to the network. The basic framework of rules was defined by GRTN in accordance with AEEG directives by means of a grid code.

On 1 November 2005, power dispatching, transmission and grid development assets were transferred to TERNA³⁶ (one of the ENEL successor companies) with the Decree of the President of the Council of Ministers of 11 May 2004. As a result TERNA became the company with responsibility for owning and managing the electricity transmission system, and for dispatching over the high-voltage (HV) and extra-high voltage (EHV) Italian grid. At the same time GRTN became focused on managing, promoting and incentivising renewables in Italy, an activity that it previously carried out in part. GRTN also changed its name to GSE (Gestore dei Servizi Elettrici – electrical services operator).

GSE has a key role in the scheme for incentivising electricity generation from renewable and “assimilated” sources (Decision 6/92 of CIP, Inter-ministerial committee on prices) and in the management of the market system based on Green Certificates. Furthermore, GSE issues the renewable energy source Guarantees of Origin (European Directive 2001/77/EC) and RECS (Renewable Energy Certificate System) Certificates. The latter are international voluntary instruments giving evidence of generation from renewable sources.

Regarding the unbundling of network operators, the Italian electricity market is organized with only one Transmission System Operator (TERNA) and many Distribution System Operators, the largest of which is ENEL Distribuzione.

In Italy the electricity tariffs for customers are regulated by AEEG. There is also legislation that regulates access to the grid network for generators in terms of certain criteria and tariffs, but this legislation is generic and is therefore not specific to DG schemes. However, concerning tariffs real transparency is limited as it is difficult to identify a standard regime for interconnection.

Some simplifications in authorization procedures have been introduced for renewables and cogeneration with the application of the Decree/Law 387/2003, the Law 239/2004 and the deliberation from AEEG 34/2005. These also regulate the injection and/or taking of electricity to/from a transmission and distribution network. Additionally AEEG 34/2005 sets the rules for plants of less than 10 MVA installed capacity, provides the conditions for the injection to the grid of the electricity produced in these plants (and for the self consumption), and fixes the prices of withdrawing of electricity by the distributors.

It is important to mention that with the Decree Law 112/1998, Italian Provinces are the reference bodies for the authorization processes for power plant less than 300 MW of primary energy.

3.9.2 Specific Market Rules

According to unbundling rules, the Italian network operators are not allowed to have activities in power generation. The network operation activity is, by law, an exclusive activity. If network operators and generators belong to an integrated vertical group, unbundling criteria will have to be respected to ensure fair competition between all market actors.

³⁴ “Autorità per l’energia elettrica e il gas” (<http://www.autorita.energia.it/inglese/index.htm>)

³⁵ “Gestore della rete di trasmissione nazionale” (<http://www.grtn.it/eng/index.asp>)

³⁶ “Rete Elettrica Nazionale SpA” (<http://www.terna.it/eng/index.asp>)

Network operators in Italy have still not yet integrated distributed generation into their network development considerations. Until now DG has been considered simply as a passive element, but studies about the advantages and disadvantages of such systems for network operations are now starting to develop.

3.9.3 Control and Operation of Third-Party Generation Plant by Network Operators

Transmission or distribution network operators do not control distributed generation units installed in Italy. In order to plan the operational management of the transmission grid, the transmission network operator (TERNA) obtains from generation plant owners their detailed hourly generation schedules. However, generators smaller than 10 MVA are exempted from presenting their hourly schedules (as defined in deliberation 34/2005 from AEEG).

3.9.4 Impact of Current Rules on DG and RES

Distributed Generation and renewable energy projects in Italy are ruled by specific national legislation. In particular by means of the deliberation 34/2005 from AEEG, special tariffs of withdrawing have been defined for generation plants whose size is less than 10 MVA. In addition photovoltaic generation plants are supported by dedicated feed-in tariffs that have been modified during 2007 and favourably received, with an impressive increase of plants under construction.

Similar results have been obtained through the mechanism of Green Certificates, applied to renewable and cogeneration combined with district heating system.

Distribution network operators are not involved in these mechanisms. They are instead involved in energy saving mechanisms, generally relating to high efficiency cogeneration. In this way they are pushed to increase the number of CHP plants.

3.9.5 Opportunity Areas

The potential benefits of the Distributed Generation to the network operators should be explicitly referred to in their long-term planning processes. These include: reducing grid reinforcement infrastructure, increasing in the quality of electricity supply service, the development of system services (e.g. voltage control, reactive power, emergency reserve), reducing failures and maintaining the option of working as an isolated grid in some possible situations.

Regarding forecasting GSE and AEEG, in compliance with the directive 2004/8/CE, are collecting historical information concerning cogeneration plants and they are preparing the potential assessment for 2010, 2015 and 2020 of penetration of cogeneration.

3.10 Luxembourg

Luxembourg differs from other EU Member States in that it is almost totally dependent on energy imports. It has not yet transposed the EC internal market Directives for electricity and gas into their national law³⁷. Legal unbundling has been applied to the two main transmission operators (Cegedel-Net and Sotel Reseau), and the electricity industry is overseen by the Institut Luxembourgeois de Régulation (ILR)³⁸.

The two electricity transmission networks within Luxembourg are not interconnected, but are integrated with the networks of their neighbouring countries, Germany and Belgium. Both of the TSO companies also operate distribution systems.

In May 2000, the Luxembourg Parliament adopted a new electricity law to implement the EU Electricity Directive³⁹. Access to the transmission and distribution networks is based on regulated third-party access tariffs set by network operators, although the tariffs are subject to approval by the Minister of the Economy after consultation with the regulator.

³⁷ According to the European Commission, January 2007

³⁸ <http://www.ilr.etat.lu>

³⁹ <http://www.ilr.etat.lu/elec/legal/pdf/loi-e.pdf>

There have been no major changes in the electricity industry structure over the last couple of years. In addition to the TSOs mentioned above, other market players include SEO (Société électrique de l'Our) and eleven companies that operate only in electricity distribution and retailing. Luxembourg maintains regulated prices for household electricity customers, and these are among the highest in Europe.

Concerning retail customers, only industrial users have benefited from market liberalisation, with a small percentage having switched supplier. The level of switching of small and medium-sized enterprises has been negligible, while the household market remains closed.

In view of the limited market development to date, and the lack of distributed generation activity in the marketplace, further analysis of Luxembourg in respect of generator ownership issues and its impact on DG has not been possible.

3.11 Portugal

3.11.1 General Legislative Environment

The Portuguese electricity sector was opened up to private initiative on 1988. Since then, the legal framework of the Portuguese power sector has been subject to several changes to transpose European Directives and to expand the liberalised market within Portugal.

In relation to the unbundling of network operators, the Portuguese electricity market is organized with one Transmission System Operator and eleven Distribution System Operators, one of which is vertically integrated.

The Portuguese transmission system was completely reorganized by the Decree/Law 198/2000 of 24th August 2000.

This Decree/Law set up a legal separation between the company responsible for the national electricity transmission grid and others companies operating in the generation and distribution of energy. The Transmission System Operator, the company REN (Redes Energéticas Nacionais)⁴⁰, was separated from the group EDP (Electricidade de Portugal)⁴¹, the historic monopoly in the electric sector. REN is the only Transmission System Operator in Portugal. Furthermore it only operates in the transmission sector and doesn't belong to a group with activities in generation or distribution of energy. The activities of REN are supervised by the Portuguese Regulatory Authority (ERSE – Entidade Reguladora dos Serviços Energéticos)⁴².

EDP Distribuição – Energia SA, the large Distribution System Operator, belongs to the group EDP, the former national monopoly with activities in generation, distribution and supply of energy. The supply of energy in the regulated market is assumed by EDP Distribuição – Energia SA. This company is the default supplier for all the market.

In Portugal the distribution activity is a regulated one, especially concerning the access to the grid and tariffs. Distributed Generation is covered by specific legislation, relating to special regime production and micro-generation. Initially the integration of this type of production was ruled out by the Decree/Law 189/88, which defined the criteria for electricity production by the use of renewable energies and cogeneration. Then, a new framework was created within the National Electrical System and cogeneration started to have an autonomous regime (Decree/Law 186/95).

The publication of the Decree/Laws 168/99 and 538/99, revised part of the previous legislation relating to the limits of installed capacity, the supply of reactive power and the value of the kWh produced by cogeneration and renewable energies. This legislation introduced changes that allowed the resolution of problems connected to the variation of the voltage profiles and reactive power.

⁴⁰ <http://www.ren.pt>

⁴¹ <http://edp.pt>

⁴² <http://erse.pt>

An important legislative rule regarding renewable energies was introduced through the Decree/Law 339-C/2001, where a technology-differentiated feed-in tariff for renewable energy based electricity was set. This tariff differentiates between technologies in terms of their relative maturities.

According to the existing framework, the generator licensing process starts with a request for preliminary information to the Directorate General for Geology and Energy relating to information on the grid capacity injection point that is collected from the grid operators (Decree/Law 312/2001).

Introduced as a demand-side instrument, a new framework for energy systems connected to the low voltage grid was launched with the Decree/law 68/2002. It sets out rules for plants up to 150kW of installed capacity and gives the conditions for the injection to the grid of up to 50% of the electricity produced annually in these plants. This Decree introduced the concept of the Producer-Consumer, and also established a technology-differentiated feed-in tariff for exported excess power.

Nowadays, apart from micro-generation systems with self-consumption, cogeneration and renewable energy projects have separate legislation and are influenced by the transposition of the Buildings Directive into national Law, which came in force in January 2007.

The overall framework described above is also in line with the European Directive 2001/77/EC regarding the promotion of electricity from renewable energies and by which Portugal is committed to attain in 2010 a penetration of 39% of renewable electricity.

Finally, there is a revision in place of the current legislation for small micro Distributed Generation with aim of putting it in line with the European CENELEC Norms for connections to the grid of small generators up to 16 Amps per phase.

3.11.2 Specific Market Rules

According to the unbundling regime, the Portuguese network operators are not allowed to have activities in power generation. The network operation activity is, by law, an exclusive activity. If these companies happen to belong to an integrated vertical group, unbundling criteria will have to be respected to ensure fair competition between all actors.

Network operators have still not integrated Distribution Generation into their operational considerations, even if they are not owners. Distributed Generation is just considered to be a passive element, and therefore the advantages and disadvantages of such systems for networks operation and planning have not been studied deeply and are not correctly valued.

3.11.3 Control and Operation of Third-Party Generation Plant by Network Operators

Distributed Generation systems currently installed in Portugal are not controlled in any way by the companies that manage the grid networks. This limits most of the potential benefits of Distributed Generation. Within this framework, the distribution network operators are therefore only exposed to the technical uncertainty that Distributed Generation can introduce relating to the management of the electricity distribution system, and as a result are not able to capitalise on the benefits.

3.11.4 Impact of Current Rules on DG and RES

Distributed Generation and renewable energy projects in Portugal fall within a legal framework that encourages the development of DG and RES. However when it comes to project implementation and development, and as Distributed Generation and other renewable energy projects cannot be controlled by the electricity distribution companies, the outcome is that each project in effect becomes a pilot project and it can be difficult to create a business case given the long (and costly) authorisation processes. The frequent and numerous delays imposed at the licensing level and at connection to grid level by the electricity distribution company and by the competent authorities is a significant burden to the development of these technical solutions in Portugal.

Furthermore there is a degree of instability at the tariff level. In some situations there are no incentives being given to the value of the kWh injected to the grid, which penalises some projects, particularly CHP plants running on natural gas.

3.11.5 Opportunity Areas

The potential benefits of the Distributed Generation to the network operators should be explicitly referred to in their long-term planning processes. At the moment the network operators in Portugal consider DG to be passive elements, and therefore the advantages of such systems for networks operation and planning have not been studied deeply and are not correctly valued. These benefits include the reduction of the need to reinforce the grid system, an increase in the quality of service, the provision of certain system services (voltage control, reactive power, emergency reserve), reducing failures and maintaining the option to operate as an isolated grid in some possible situations.

The introduction of power guarantee contracts could be a way of reducing this uncertainty. In relation to the services to the system provided by the Distributed Generation there is also a need for hardware and measurements for the control of these services in real time.

3.12 Spain

3.12.1 General Legislative Environment

The Spanish energy institutional framework is organised in the following way:

- a) The political authority in Spain is the Ministry of Industry, Tourism and Commerce through the Secretary General for Energy. The administration is done by the General Department of Energy Policy and Mines which is responsible for the production of energy policy, proposals for tariffs, and ensuring energy supply in Spain.
- b) The *Comisión Nacional de Energía* (CNE), created in 1998 regulates the whole energy sector (electricity, gas and oil). It works in collaboration with Consultative Boards (Electricity, Hydrocarbons) representing central and regional governments, market operators and consumers.
- c) Autonomous regions are responsible for issues specific to their area, and implement energy policies defined by the regional and central governments, such as promotion of renewable energy sources.

Until 1997 all electricity activities in Spain were managed by public vertically integrated utilities in pre-defined geographical areas. The liberalisation of the electricity, gas and oil markets was launched in the 1990s and progressed more rapidly than in most other EU countries. By 2003, the electricity and gas markets were fully open to competition. The Spanish electricity sector is now organized in accordance with the framework set out in the *Electricity Act 54/1997*.

In the electricity sector, the transmission system and market operations have been separated out from the vertically integrated utilities following the establishment of a Market Operator and a Transmission System Operator (TSO). Transmission system operation is the responsibility of *Red Eléctrica de España* (REE). This company is unbundled in ownership terms. All transmission assets owned by Spanish utilities were integrated to REE in 2003. REE has no subsidiary acting in other areas than transmission or network operation.

Regarding Spanish legislation, distribution activities cover distribution system operation and supply of electricity at regulated tariffs. Distribution is carried out by subsidiaries of the traditional utilities (ENDESA, IBERDROLA, UNIÓN FENOSA, HIDROCANTÁBRICO and VIESGO-ENEL) and by small operators (more than one hundred). Legal unbundling obligations have been implemented⁴³ according to Spanish legislation, which considers partially the provisions of the Electricity Directive. In relation to functional unbundling some provisions have been implemented. For

⁴³ The Spanish concept of distribution activities includes the activity of electricity supply in regulated markets.

example, distribution companies have no activities in generation or supply in the open market.

The most important change in regulation started with *Ley 54/1997* from which market schemes were introduced in activities like generation and commercialization. This includes provisions maintaining the transmission and distribution sectors as regulated businesses. From the Distributed Generation point of view, *Ley 54/1997* introduces the concept of special regime generation for those plants with an installed capacity lower than 50MW. Specific rules apply to these special regime plants, and these differ from those applied to larger generation plants participating in the wholesale pool market.

The *Real Decreto 2818/1998* introduced an additional premium to the special regime installations, on the top of the wholesale pool market price depending on the technology. Nevertheless some renewable energy technologies had the option of receiving a fixed price. These installations could also participate in the wholesale pool market, although in this case there were no incentives in place and there were even additional costs.

The *Real Decreto 841/2002* was intended to encourage a greater penetration of special regime generation into the wholesale pool market, receiving in this case a further increase in premium. It also introduced the concept of production aggregation from different generation sites, in order to improve the ability to participate in the market. Furthermore, it introduced the possibility of participation in the system operation and service markets (resolution of technical restrictions, consumption and complementary services). This implies that the aggregation of renewable energy installations enables a more predictable power output to be provided so that services of this type can be provided. In fact the predictability requirements lead to aggregators having to offer a technology mix in their systems to provide these services – this became an entry barrier.

The *Real Decreto 436/2004* introduced rules enabling Distributed Generation to supply the market and receive a constant value for the kWh produced. The kWh payments received by the generator vary according to the technology and to the number of years that the system has been in commercial operation. In general terms all DG systems have the same rights and obligations as other generators. However this is not so relation to complementary services – generation should be aggregated as it was seen before. Independently of the selected option there is a premium for the reactive power compensation and for the power factor.

3.12.2 Specific Market Rules

Distribution companies have no activity or participation in the generation market. Their sole activity is to operate their dedicated distribution network and all associated auxiliary systems. This exclusive activity permits fair competition and equal treatment between all actors, especially considering the Spanish deep network connection cost system that exists in Spain.

Distributed Generation in Spain has been developed through two different schemes based on sales tariffs: a feed-in-tariff system and a wholesale market system with fixed premiums. However, some benefits for the grid of Distributed Generation are considered in the Spanish framework. For example, both alternatives (feed-in-tariff or wholesale market with fixed premium) consider an alternative income associated with reactive power; the potential income (or charge) depends on time period and on the power factor of the unit. Distributed Generation units are encouraged to consume or supply reactive power according to the grid needs. Furthermore, an economic incentive for wind power has been fixed for plants to be able to cope with voltage dips without tripping.

Although Spanish systems consider some of the positive and negatives impacts of Distributed Generation to the grid, network operators do not include Distributed Generation in their planning processes. As a result, services such as those relating to the dispatch of Distributed Generation plants in case of network congestion are not considered. Network operators still consider Distributed Generation to be an extra complexity that does not provide economic benefits and cause only new operational and investment issues.

Including Distributed Generation in network and demand planning in Spain is absolutely essential to identifying the eventual benefits to the grid of such systems and to ensure that network investments are optimised.

3.12.3 Control and Operation of Third-Party Generation Plant by Network Operators

Nowadays this is practically impossible in Spain. Firstly, the separation of activities required by the current regulatory framework prohibits an entity involved in regulated activities (such as distribution) to also be involved in non-regulated activities (such as generation). Consequently distribution network operators cannot become owners of, or take control of, a Distributed Generation plant.

Secondly, in general terms there are no regulatory mechanisms in place that allow the distribution network operator to give signals to a preferred location in order to be able to include Distributed Generation in their grid planning activities. This applies even though the network operator does not actually own the Distributed Generation facility. Nowadays in Spain the development of Distributed Generation is totally independent from the development of the distribution grid. They do not receive any locational signals; neither are there market rules for the control and operation of third party generation plants.

3.12.4 Impact of Current Rules on DG and RES

Given the current regulatory framework, the distribution network operators see their obligations only as planning their grid networks without being able to consider the deployment of Distributed Generation embedded in their network as an option. Therefore, the development of renewable energy projects and other Distributed Generation plants becomes limited to the initiative of private or public owners different from the grid operators.

3.12.5 Opportunity Areas

A regulatory change could be proposed that provides an incentive for Distributed Generation plant to offer support the supply system at peak times. This could be achieved by awarding power availability⁴⁴. Another possibility is to give the distribution network operator the opportunity to manage DG plants in situations of technical restrictions in the grid.

In the current regulatory framework the distribution company sees itself obliged to accommodate and manage network faults without considering the potential benefits of active systems within its network. In the case of voltage collapse a proposal could be to permit the distribution network operator to control these power plants under a framework of technical solutions for its grid. Under this new framework the Distributed Generation would receive a premium for the provision of this service.

⁴⁴ As is already implemented for centralised generation plant in some Member States (e.g. the UK)

3.13 Sweden

3.13.1 General Legislative Environment

The Swedish Electricity Act of 1997⁴⁵ is the base legislation relating to the electricity market in Sweden. It was amended in 2004⁴⁶ in order to bring the Swedish regulatory framework into line with the requirements of the European Commission's new Electricity Market Directive. The main principle behind the amended Bill is a requirement for functional separation between electricity network activities and electricity trading activities in order to reduce the possibility of cross-subsidisation and to ensure that the network companies act independently.

The production and sale of electricity is subject to the competitive market, while network operations are regulated and monitored to ensure that they are efficient.

Since 1 January 1995 Svenska Kraftnät has been designated as the authority with transmission system responsibility. It has the power to issue direct orders to producers to increase and decrease production rapidly in order to keep the balance of the system. If necessary to keep the balance of the system, it can also issue orders to decrease electricity consumption. Svenska Kraftnät has also been given the right to define the technical requirements, the reliability requirements, etc, for electricity generation plant and networks. Further information can be obtained from the Svenska Kraftnät website⁴⁷.

3.13.2 Specific Market Rules

The Swedish Electricity Act prohibits any entity involved in the generation or trade of electricity to be involved in network operations. Hence network operators are not permitted to own generation plant.

As with most other Member States, the Transmission System Operator (Svenska Kraftnät in the Swedish case) is responsible for maintaining the balance between the production and consumption of electricity. This task is performed by the Operating Balance Service, which monitors the electricity balance (production versus consumption) in the short-term and keeps the frequency of the networks at 50 Hz. Svenska Kraftnät collaborates with thirty or so players, known as balance providers in order to deliver system balancing in practice. Through bilateral agreements with agreements with Svenska Kraftnät, these balance providers assume the "balance responsibility" for one or more electricity consumers. This means that they take on the financial responsibility for Sweden's electricity system being supplied with the same amount of power that is being used by the electricity consumers for whom the balance responsibility relates to. Svenska Kraftnät's Balance Service corrects minute-by-minute frequency deviations. This is normally needed when balance providers cannot create a perfect balance of production & consumption. The price of regulation is set for each hour of delivery and the cost of each balance provider's imbalance between supply and consumption is later calculated in the balance settlement.

3.13.3 Control and Operation of Third-Party Generation Plant by Network Operators

As detailed above, network operators are prohibited from owning generation plant in Sweden as a result of unbundling legislation.

The Transmission System Operator (Svenska Kraftnät)⁴⁸ is responsible for providing and procuring ancillary services in order to maintain the stability of the transmission grid network. These services are provided in the main by generators under the framework of negotiated contracts.

⁴⁵ [www.stem.se/web/biblshop_eng.nsf/FilAtkomst/eng_ellag.PDF/\\$FILE/eng_ellag.PDF?OpenElement](http://www.stem.se/web/biblshop_eng.nsf/FilAtkomst/eng_ellag.PDF/$FILE/eng_ellag.PDF?OpenElement)

⁴⁶ Bill No 2004/05:62, Implementation of the EU Directive concerning common rules for the single markets in electricity and natural gas etc

⁴⁷ <http://www.svk.se/upload/3173/Engwebb.pdf>

⁴⁸ <http://www.svk.se>

In relation to the distribution network and the role of DG and RES, at the current time there appear to be no formal mechanisms in place that facilitate the supply of ancillary services by DG and RES to the DNO in order to assist in the management of the distribution network. Hence at the current time DG and RES systems play no role in support of the DNOs in managing the distribution network.

3.13.4 Impact of Current Rules on DG and RES

At the current time DG and RES systems appear to play no active role in support of the DNOs in managing the distribution network within Sweden. This is due to the legislative structure in place and the historic development of the electricity industry in Sweden.

Hence the current rules relating to generator ownership and control in Sweden can generally be considered restrictive for DG and RES.

3.13.5 Opportunity Areas

These are unclear at present in Sweden given the current legislative framework. If a network services market were to develop at distribution level then it is conceivable that DG and RES could offer services of this type to the network operators. Further work is needed to establish the mechanisms by which this could be implemented in practice and whether such a market at distribution level is merited.

3.14 The Netherlands

3.14.1 General Legislative Environment

The government in The Netherlands adopted the principle that the EU directives on the free market for electricity should be implemented thoroughly and as quickly as possible. The Elektriciteitswet (Electricity law) 1998 lays the legislative framework for unbundling and a free market. The Ministry of Economic Affairs charged the Directie Toezicht Energie (DTe) to implement the goals of the Elektriciteitswet and to report annually on the status of the actual openness and effectiveness of the electricity market. Any non-transparencies and discriminatory situations have to be reported by DTe. DTe uses an annual monitor for this reporting process.

At the same time, the Ministry of Economic Affairs stays involved in the sector and regularly analyses the national and international developments on the energy markets in order to ensure a reliable, effective environmental friendly energy use with sufficient security of supply. This includes the introduction and stimulation of renewable energy. The Ministry will use its power to steer the sector into the desired direction with supplementary legislation. This means that issues with respect to fuel choice, distributed generation and the application of renewables are not left to the free market but are influenced by political decisions. If the Minister fears that insufficient production and transportation capacity is made available, he can force the producers to build new capacity. Too small a margin between production capacity and demand would result in high electricity prices because of insufficient market flexibility.

Producers of electricity are ultimately not allowed to own and operate the high-voltage transmission grids. The independently acting grid operators should be decoupled from the commercial activities of the producers. Grid operators have to maintain sufficient quality and capacity of the grid in the most efficient and economic way. Interesting for DG is that they have to consider improvement actions to demonstrate that sufficient measures are taken to ensure the implementation of decentralised generation, renewables and demand control to avoid unnecessary replacement or enlargement of central power plants (article 16). A grid operator buys the needed electricity from the producers based on a transparent, non-discriminatory and market compliant procedure.

3.14.2 Specific Market Rules

The Directie Toezicht Energie (DTe = the Regulator) has been charged by the Ministry of Economic Affairs to stimulate competition in the energy markets. This is based on the Elektriciteitswet and the Gaswet. DTe has to report to the Minister annually about the situation in the market and the effectiveness of the open competition. For this, DTe uses a monitor with thorough economic indicators for open markets. Special

attention is given to the unique situation with electricity that its demand has a very low sensitivity to price, that electricity is difficult to store and that having just a few large producers tends to reduce price differentials. Just a few big producers could easily push small players, such as DG owners, out of the markets. Big producers can also keep the price of electricity artificially high by making available an absolute minimum of production capacity.

The wholesale market for electricity in The Netherlands is implemented in four ways:

- (i) The bilateral market between producers, large customers and suppliers. The duration of such contracts is often between one and two years because of the volatility of prices;
- (ii) The over-the-counter market, in which a limited number of brokers are active;
- (iii) The day-ahead spot market (APX), where production (including imports) and demand are being matched on an hourly basis;
- (iv) The unbalance market of TenneT (the national transport grid operator), which is the market to cover control power and reserve power (system services or ancillary services). Producers can offer (bid) reserve power to cover any unbalance caused by other producers failing to deliver. The costs of the unbalance have to be paid by the failing party.

3.14.3 Control and Operation of Third-Party Generation Plant by Network Operators

TenneT has facilities to directly control the output of a number of central power plants for frequency stability control. Normally, with a correct balance between production and demand, the instantaneous frequency varies only little. Each power plant connected to the national grid produces what is agreed. However, in case of larger deviations between demand and production, the frequency can exceed specified limits so that TenneT starts to control directly the output of some power plants. In this case, the directly controlled power plants receive a payment for the system service that they have provided.

TenneT can also have agreements with producers to make extra capacity available or to reduce capacity within a short time span of say 10 minutes. Command for such a change is usually given by telephone to the plant operator. This flexibility in power capacity comes also at a price and it is therefore another paid system service.

TenneT has also arrangements with power plants for so-called black start facilities, to restart the system in case of a substantial black out. Some power plants have diesel engine units that either produce sufficient electricity to start up a power plant, or have a direct drive coupling with a large generator set. This is another paid for system service.

TenneT does not control power plants that do not provide system services. Third party producers have to make sure that they have the promised capacity on line at the agreed moment. Failure to do so will result in a fine. Non-dispatchable power, such as that from wind turbines, has an intrinsically low value on the open market since other parties have to compensate for the fluctuations.

3.14.4 Impact of Current Rules on DG and RES

The current rules are not restrictive and negative for distributed generation. Network operators are even supposed to stimulate a good implementation of distributed generation, cogeneration and renewable electricity if the result serves to improve security of supply, reduce emissions and improve reliability. However, the author of this report could not find the specific measures that a network operator can apply to ensure this stimulation. Neither is he aware of examples where action by the network operators resulted in building local generating capacity.

DTe is charged with carrying out subsidy measures for renewables, CO₂-free electricity and cogeneration. That means that the government recognises that the benefits of these generating methods are not fully rewarded in an open market. However, the Minister of Economic Affairs determines the subsidies, and practice has shown a very unreliable support pattern for such long-term investments as a local power plant. That makes investors hesitant.

3.14.5 Opportunity Areas

Although it might help DG substantially if a network operator could own distributed generation to optimise the grid, such an approach would remove the independence of the network operator. It is better to have legislation that obliges network operators to signal the need for local power in his grids and let third parties bid for that. Third parties in these cases can either be a customer in need of heat and power, an independent power producer or a utility. The regulator can check if the network operators have applied the proper procedures in this area.

It might also be possible that a network operator can only grant permission to connect to a large consumer if this consumer provides a study showing how his energy needs can be most efficiently met. Further support of DG is possible via building legislation or industrial site legislation.

3.15 United Kingdom⁴⁹

3.15.1 General Legislative Environment

The UK Electricity Act of 1989⁵⁰ provided the legislative framework for the liberalised electricity market when it was initially introduced. At the time this involved the setting up of separate markets in England & Wales and in Scotland. The Act introduced the role of the UK electricity regulator and also introduced the requirement for generators, electricity transmission companies and electricity suppliers to obtain licenses before being able to participate in the market. These licences defined the duties of the licence holders and could be granted either by the Secretary of State for Energy or the Director General of the regulatory authority.

Some activities, whilst falling within the definitions of a licensable activity given in the Electricity Act 1989, are exempt from the need to hold a licence. The Electricity (Class Exemptions from the requirement for a licence) Order 2001 SI 3270⁵¹ provides details of these exemptions. Broadly the Exemptions Order 2001 provides the following classes of exemptions for generation:

Class A (1) – provide less than 10 MW

Class A (2) – declared net capacity of less than 100MW with less than 50 MW being exported to the system

Class B - offshore

Class C - those connected at 30 September 2000 not normally capable of exporting more than 100MW to the total system

Class D – generators never subject to central despatch.

The Utilities Act of 2000⁵² made several important amendments to the Electricity Act that were deemed necessary after a sustained period of market operation and following some structural changes within the market. The first was the introduction of the “Gas and Electricity Markets Authority” (GEMA), which in effect now governs OFGEM⁵³. The responsibility for granting licences was also transferred to GEMA although in practice this role is still performed by OFGEM on their behalf. Another important example was the introduction of distribution as a separate licensable activity.

The most recent legislation (Energy Act 2004⁵⁴) defined the creation of a single electricity market for Great Britain (England, Wales and Scotland) and also included provisions to support the development of renewable energy systems.

⁴⁹ The situation in Northern Ireland is not included in this study

⁵⁰ http://www.opsi.gov.uk/ACTS/acts1989/Ukpga_19890029_en_2.htm#mdiv4

⁵¹ Downloadable from <http://www.hms.o.gov.uk>

⁵² <http://www.opsi.gov.uk/acts/acts2000/20000027.htm>

⁵³ The electricity and gas market regulator in Great Britain (www.ofgem.gov.uk)

⁵⁴ <http://www.opsi.gov.uk/ACTS/acts2004/20040020.htm>

3.15.2 Specific Market Rules

OFGEM guidance document "Gas and electricity licence applications 86/05"⁵⁵ published in March 2005 explains the regulatory and legal framework within which OFGEM considers applications for all types of licence. This document confirms that:

- "Licensees may not hold an electricity distribution licence and an electricity supply licence or an electricity interconnector licence" (section 9.3)
- "Licensees may not hold an electricity transmission licence and an electricity interconnector licence" (section 11.4)
- "Licensees may not hold an electricity interconnector licence and an electricity supply, an electricity generation, an electricity distribution or an electricity transmission licence" (section 12.5)

Interestingly, in relation to generators the OFGEM guidance document referred to above (section 10.2) states, "There are no specific criteria for electricity generation applications other than the general criteria that all applicants must satisfy as set out in Chapter 3". Chapter 3 relates to issues such as the provision of information that applicants must submit with their application, the acceptance criteria applicable to licence applications, and the ability of licence holders to finance their business activities.

Large generation plants⁵⁶ in the UK are required to provide specific mandatory ancillary services⁵⁷ as part of their licence agreements. Furthermore, it is possible for these generators to enter into separate agreements with the network operators to provide other, non-mandatory, ancillary services. However, at the distribution network level there are no detailed requirements regarding the provision of ancillary services in the UK Distribution Code, and hence there is no framework in place at the current time for enabling the provision and trading of ancillary services from DG schemes. To this end, in 2004 the UK Department of Trade and Industry commissioned a study into the potential for creating ancillary service markets at the distribution level in Great Britain⁵⁸. This report concluded that although the value of the most feasible ancillary services will be relatively low, they could still offer incremental revenue opportunities for DG, in particular in respect of network security contribution. Furthermore there are likely to be niche opportunities for DG to provide ancillary services, usually in circumstances where constraints restrict network development. It was therefore recommended that the principles (and potentially standard commercial arrangements) for procurement processes and valuation methodologies relating to DG ancillary services be established.

In respect of the provision of reactive power services, at the transmission level the TSO (National Grid) has a portfolio of mechanically switched and (faster) thyristor controlled reactive compensation plant, and it also instructs central generation plant to provide reactive power in accordance with their mandatory service obligations. In addition there has been a reactive power tender round in operation by National Grid for several years into which generators and other market players can bid to supply reactive power to the market. The contracts resulting from this are normally of 12 months duration. Hence, at the transmission level in Great Britain the TSO can own its own reactive power plant even though a separate reactive power market for large generators exists. At the current time, however, there are no mechanisms in place at the distribution level to allow DG schemes to trade reactive power. Due to the locational nature of voltage control, it would appear most likely that any reactive market for DG will eventually comprise bilateral arrangements with the host network operator utilities. It is therefore unclear at the current time whether distribution network operators will be permitted to own and operate their own generation for reactive power provision.

⁵⁵ http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/10659_8605.pdf

⁵⁶ Those generally connected to the transmission system and that must comply with the Grid Code

⁵⁷ Transmission and distribution network services that generators can provide to the network operators (e.g. frequency response, reactive power provision, etc)

⁵⁸ <http://www.ensg.gov.uk/assets/dgqc00030.pdf>

3.15.3 Control and Operation of Third-Party Generation Plant by Network Operators

The general approach within the UK electricity markets is for transmission-connected generation plant to self-schedule with declarations of output being made to the network transmission network operator several hours in advance of real time in order to allow the matching of supply and demand through a separate market mechanism. Hence transmission network operators are not permitted to actively take control of third-party generation plant, but instead through contractual arrangements generators can be obliged to provide certain performance characteristics requested by the TSO when circumstances require.

In the case of DG schemes that are connected at distribution voltages, again it is normal for the plants to self-schedule within performance limits agreed with the host DNO as generally defined in the Distribution Code⁵⁹ and in the technical performance specifications of the DNO. However, there appears to be nothing in the regulations that would preclude DNOs from contracting network services from DG systems in a similar manner to the services purchased by TSOs from larger generators, should they choose to do so. However, to date there is little evidence of this occurring in practice.

3.15.4 Impact of Current Rules on DG and RES

Primarily for unbundling reasons the network operators in the UK are currently not permitted to own generation plant.

At transmission level, the TSO relies on contracts with generators to provide network services, or on the specified technical response of the plant in line with Grid Code⁶⁰ requirements. To this end there is a maturing market for the contracting of network services by the TSO⁶¹.

At the distribution level, although there appears to be no legal or regulatory reason why DG or RES could not be contracted to provide network services to DNOs, at the current time there appear to be little or no frameworks in place within the UK to enable this to be implemented in practice. Hence, whilst it is recognised that competition legislation requires unbundling with the electricity market, the current ownership rules and practices within the UK are very restrictive for DG and RES in relation to the very valuable network services that they may be able to provide DNOs. The main barrier at present is that neither technical nor commercial frameworks are in place to enable DG and RES systems to offer network services to the DNOs. It is clear therefore that new frameworks need to be developed in order to enable arrangements of this type to take place between the DNOs and the owners of DG and RES generation plant.

3.15.5 Opportunity Areas

As implied above, although it is unlikely within the current regulatory framework that DNOs will be permitted to own and operate DG and RES systems due to unbundling legislation, their deployment as a means of providing network services to DNOs is a significant opportunity for generation sources of these types. But without appropriate technical and commercial frameworks in place, the uptake of DG and RES in these applications will remain negligible.

Therefore to permit DG and RES systems to offer network services to DNOs, it is recommended that consideration be firstly given to determining whether in certain circumstances⁶² DNOs could be permitted to own and operate DG and RES systems for network performance reasons. Secondly, and regardless of whether DNOs are permitted to own and operate DG and RES systems, it is recommended that technical and commercial frameworks are developed and implemented to permit DG and RES to offer network services to DNOs.

⁵⁹ www.dcode.org.uk/

⁶⁰ <http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/>

⁶¹ <http://www.nationalgrid.com/uk/Electricity/Balancing/>

⁶² These circumstances would have to be explicitly defined and would relate only to cases where using DG and RES at specific network locations for network performance reasons would be more cost beneficial than investing in network infrastructure reinforcement or expansion

4 SUMMARY OF FINDINGS

This section provides an overview of the key findings of this study, broken down into legislative aspects, practices currently deployed in EU Member States, and finally those areas that potential provide DG and RES with opportunities within the context of the cope of the study.

Legislation

European Directive 2003/54/EC is pivotal to the structure and operation of the energy markets within Member States of the European Union. Furthermore, this Directive is very clear in respect of the definition of the technical and legal boundaries that must exist between the different market actors within the electricity and gas markets, although it does not specify the exact mechanisms by which Member States should implement these requirements in practice. A key clause of Directive 2003/54/EC relating to this issue is Clause (8):

“...It is necessary that the independence of the distribution system operators and the transmission system operators be guaranteed especially with regard to generation and supply interests. Independent management structures must therefore be put in place between the distribution system operators and the transmission system operators and any generation/supply companies.”

The practical result of this is that where a company has interests in distribution and generation, these must be managed and operated as separate independent companies so as to ensure that no market manipulation takes place. In many Member States these entities are in fact completely independent companies with no common managerial or structural links. Hence in effect distribution network operators are not permitted to own generation plant, unless there are specific exemptions in place that relate to particular Member States. The natural consequence of this is little or no coordination between grid network and generation planning, leading potentially to a fragmented electricity supply infrastructure with lower overall system efficiency than the equivalent system where generation and grid network planning are integrated. Article 14 (7) of Directive 2003/54/EC, attempts to address this issue:

“When planning the development of the distribution network, energy efficiency/demand-side management measures and/or distributed generation that might supplant the need to upgrade or replace electricity capacity shall be considered by the distribution system operator.”

This provides a requirement for distribution network operators to consider distributed generation in their network planning processes. However the Directive does not indicate the mechanisms by which both clause (8) and Article 14 (7) can be satisfied without a degree of coordination between the distribution network planners and the generation companies. Anecdotally, there is very little evidence of distribution system operators considering distributed generation in their network planning processes as per the requirements above. This is supported by other more-detailed ELEP research published in 2006⁶³.

Hence in summary, although there are good reasons for the generation ownership rules contained with Directive 2003/54/EC to ensure openness and transparency within the electricity markets, the clear dividing lines between generation ownership and distribution network operators have had negative consequences for DG and RES deployment. This is because DG and RES have been overlooked as network planning tools in favour of DNO infrastructure investment due to the fact that the DNOs cannot own and operate these plants. The overall consequence of this is that the significant operational benefits that DG (and maybe to a lesser degree RES) can provide to distribution networks are overlooked at the planning stage to the detriment of optimal system operation.

⁶³ http://www.elep.net/files/ELEP060531_WP2_D2-2_v1.pdf

Member State Experience and Practice

All Member States have either completed or are in the process of implementing the unbundling and ownership rules described in European Directive 2003/54/EC. This prohibits network operators from having ownership interests in generation plant.

Although network operators are not permitted to have ownership interests in generation plant, the contracting of ancillary services⁶⁴ by transmission network operators from large generators is widely implemented across the EU. There are different mechanisms used to implement these ancillary services, but they generally involve bilateral contracts between the network operators and generators or some form of tendering procedure. In relation to the bilateral contracts, at transmission level many large generators are required to provide these ancillary services to the TSO as part of their license terms in return for reasonable payment.

Whilst there are mature ancillary service arrangements at transmission level, at the distribution level there is very little evidence within European Member States of DG and RES plants being contracted to provide network services to support the DNOs in the management and operation of their distribution networks. There is certainly no evidence of DG schemes being installed solely for the purpose of network support within distribution networks. Nor is there any evidence of widespread consideration of DG and RES by DNOs in their network development and planning procedures as is required by Directive 2003/54/EC. The main reasons for this appear to be:

- DNOs have historically designed, built and managed their distribution networks on the premise that very little or no generation will be connected at distribution voltages. So there is a general reluctance to change design approaches that have been developed over many years. Furthermore there appears to be a lack of enforcement of the requirements of European Directive 2003/54/EC relating to the consideration of DG as an alternative to network reinforcement in the planning processes.
- European unbundling legislation that prohibits DNOs from ownership interests in generation plant creates issues relating to the availability and control of such generation plants when they are needed by DNOs. For example, the commercial interests of the generator may over-ride the operational needs of the DNO at the time when the DNO needs it most. This creates operational uncertainty for the DNO that it may not be prepared to accept.
- Network ancillary services have traditionally been the responsibility of TNOs, and DNOs have played no part in their provision.
- In view of the historic development of the role of DNOs, there are no commercial mechanisms in place in the EU that deal with the supply of ancillary services to DNOs by DG and RES schemes. Until commercial mechanisms of this nature are developed, and until accurate values are assigned to these services, there seems to be little incentive for DNOs to engage with DG and RES installations in this regard⁶⁵. However, the whole topic of ancillary services at distribution level is considered by the ELEM team to be a very significant opportunity for DG and RES, and it should also provide increased flexibility for DNOs in terms of the way they manage and operate their networks.

Opportunity Areas

As detailed above, the current legislative environment has the effect of prohibiting the ownership of generation plant by network operators, and there are of course very good market and competition reasons why this should be the case. But a downside of this is the impact it has in terms of restricting the deployment of DG and RES at distribution level by DNOs, thereby limiting the scope of opportunity for DG and RES to be used effectively as a network planning and management tool by DNOs, thus

⁶⁴ Frequency response, reactive power, black start, etc

⁶⁵ Only one study (performed in the UK) is known of that has assessed the potential for creating ancillary service markets at the distribution level (<http://www.ensg.gov.uk/assets/dqcg00030.pdf>)

restricting their market application. This can potentially lead to a reduction in overall electricity system effectiveness and efficiency, and can impose artificial barriers to DG and RES in respect of their ability to offer a suite of services to the electricity market.

In the context of the above, the provision of network ancillary services to DNOs is therefore considered to be the main area of opportunity for DG and RES arising from the analysis performed in this study⁶⁶. At the current time this is a very immature market opportunity in that virtually all network ancillary services are currently provided at transmission level, with the distribution sector playing little or no part. However, as alluded to above, it is likely that more intelligent solutions will be needed for operational management at the distribution level, especially as it is becoming increasingly difficult to gain the appropriate permissions for new overhead lines to develop the distribution infrastructure. DG and RES schemes are well placed to support this requirement, especially for “local” services such as voltage control, but new and innovative commercial mechanisms are needed to ensure that appropriate credit is given to the positive contribution that DG and RES can make in this area.

⁶⁶ This study focuses solely on those issues arising from the policy and legislative environment relating to DG and RES ownership, particularly in terms of how that relates to distribution network operators

5 CONCLUSIONS AND POLICY RECOMMENDATIONS

The high-level conclusions from this study are summarised as follows:

- European Directive 2003/54/EC is clear in its definition of the technical and legal boundaries that must exist between the different market actors within European electricity and gas markets. The unbundling rules contained with 2003/54/EC require the separation of distribution and generation interests, thus in effect prohibiting distribution network operators (DNOs) from owning generation plant⁶⁷.
- Although there are good reasons for the generation ownership rules in Directive 2003/54/EC, the unbundling requirements of that Directive, coupled with the traditional network planning approaches adopted by DNOs, have introduced barriers to the deployment of DG and RES at distribution level. These barriers relate primarily to the lack of consideration of DG and RES in the network development planning processes within DNOs, thus resulting in network infrastructure investment being the chosen method of network capacity increase rather than DG deployment.
- The contracting of large generators by transmission system operators (TSOs) for ancillary services is widespread across the EU. However, there is very little evidence that DG and RES systems are being contracted at distribution level by DNOs within Europe. Within the current legislative framework, apart from its traditional deployment for on-site power requirements, the deployment of DG for distribution network ancillary services is considered to be the most significant opportunity identified in this study. Such deployment would help contribute to the development of more flexible and potentially more efficient distribution networks, providing valuable contributions both to market development and to lowering overall fuel consumption.

The following recommendations have therefore been developed to provide potential solutions to address the barriers to DG and RES arising from the current legislative framework, whilst taking account of the common policy principles adopted within the EU electricity market.

- Action should be taken at European level to enforce Article 14 (7) of Directive 2003/54/EC in respect of the requirement for distribution system operators to consider the use of DG as a means of supplanting the need to upgrade or replace electricity capacity. The lack of enforcement of this requirement is currently restricting the use of DG in applications where such technologies can provide clear benefits both in terms of reducing distribution grid infrastructure costs and in terms of improving overall energy delivery efficiency.
- To reinforce the above, it is recommended that consideration be given to the introduction of legislation obliging network operators to signal the need for local power generation within their grid networks (as an alternative to grid reinforcement) and then to permit third parties to bid competitively for the generation contracts. In specific cases where the DNO believes that the deployment of DG is not beneficial, the DNO should be required to provide a written submission (ideally to a regulatory body) justifying and demonstrating why distribution network infrastructure reinforcement is the preferred solution. The scope to which DNOs can manage and control generators under this type of arrangement would have to be carefully assessed. The regulators would have a key role to play in monitoring that DNOs apply appropriate procedures.
 - As an alternative to the above, consideration could be given by policy makers at European and Member State level to defining the circumstances under which DNOs could be permitted to own and operate DG and RES systems to improve network operation and performance. It is recognised

⁶⁷ Article 15 of Directive 2003/54/EC provides the opportunity for Member States to provide exemptions to the unbundling rules specifically for integrated electricity undertakings serving less than 100,000 connected customers, or those that serve small isolated systems.

that this approach is in contradiction to unbundling legislation and is therefore not likely to be the preferred solution from the point of view of electricity market development. In view of this, the circumstances under which DNOs could own DG and RES would have to be explicitly defined. These are only likely to relate to cases where deploying DG and RES at specific network locations for network performance reasons would either be more cost beneficial than investing in network infrastructure, or would provide improvements to overall network efficiency. Hence it is important that DG deployment of this kind does not impact negatively on the external competitive power generation market.

- In view of the fact that DG and RES systems do not currently provide network ancillary services for DNOs at the distribution level, it is recommended that policy measures are developed and implemented to encourage the use of DG and RES for this purpose. This requires:
 - Revisions to existing DNO technical/planning frameworks that provide recognition of the positive contribution that DG and RES can play to the development and management of "more active" and potentially more efficient distribution networks within Europe
 - The development and implementation of new commercial frameworks that permit a market to develop in distribution-level ancillary services within which DG and RES can compete. These frameworks must provide a fair and reasonable financial reward for distribution ancillary services based on aspects such as the operational flexibility they can provide and the potential infrastructure investment deferrals that their deployment can permit.

6 REFERENCES

- [1] Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC
- [2] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market
- [3] Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC
- [4] Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings
- [5] "The share of renewable energy in the EU – Country Profiles – Overview of Renewable Energy Sources in the Enlarged European Union" (Commission Staff Working Document SEC (2004) 547, 26 May 2004)
- [6] "Annual Report on the Implementation of the Gas and Electricity Internal Market" (European Commission report COM(2004) 863 final, 5 January 2005)
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- [8] Elektriciteitswet 1998 (text 13 December 2006), Den Haag
- [9] DTe, Monitor methode groothandelsmarkt elektriciteit, Referentiedocument, Den Haag, July 2005
- [10] TenneT, Kwaliteits en capaciteitsplan 2006 – 2012, Arnhem, December 2005.
- [11] "Ancillary services – Unbundling electricity products, and emerging market", Eurelectric report 2003-150-0007, February 2004

Annex 1 – Legislation in Spain

Bellow is the most relevant legislation by chronologic order, which deals with the different aspects of the Distributed Generation in Spain:

- *Orden ministerial from 5th September 1985* which establishes the administrative and technical rules for the running and connection to grid of hydro plants up to 5.000 kVA and autonomous electricity generation plants.
- *Real Decreto 2366/1994* on the production of electricity by hydro plants.
- *Ley 54/1997* by which the electricity supply activities, based on generation, transmission, distribution, commercialization and international exchanges, as well as the economic and technical management of the electricity system are ruled.
- *Real Decreto 2818/1998*, from 23rd December, on the production of electricity by plants running on renewable energies, residues and cogeneration.
- *Real Decreto ley 6/2000*, from 6th June, which approves urgent measures for promotion of the competition in the goods and services markets (electricity sector's liberalization).
- *Real Decreto 1995/2000*, from 1st December, which regulates the activities of transmission, distribution and commercialization, supply and the procedures for authorizations of electricity installations.
- *Real Decreto 1664/2001*, which covers the access tariffs to the distribution and transmission electricity networks.
- *Real Decreto 841/2002*, from 2nd August, which regulates the special regime plants and their participation in the production market, determines the information of provisional production to be supplied and the acquisition by the commercializers of its produced electricity.
- *Real Decreto 1432/2002*, from 27th September, which establishes the methodology of the mean electricity tariff or reference electricity tariff.
- *Real Decreto 436/2004* from 12th March, which establishes the methodology for the legal and economic regimes of electricity production activity under special regime conditions.
- *Real Decreto 2351/2004*, from 23rd December, which modifies the procedure of resolution of technical restrictions and other regulatory measures of the electricity market.
- *Real Decreto 1454/2005*, from 2nd December, which modifies some dispositions of the electricity system.